

AD-A105 649

HOSKINS-WESTERN-SONDEREGGER INC LINCOLN NE
NATIONAL DAM SAFETY PROGRAM. WELTON IDEKER DAM (MO 11010), MISS--ETC(U)
MAY 79 R S DECKER, G G JAMISON, G ULMER

F/G 13/13

DACW43-79-C-0046

NL

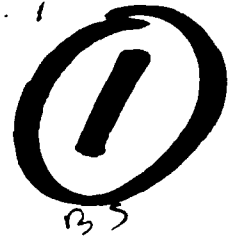
UNCLASSIFIED

1 OF 1
AD A
- (1) (1) (1)

END
DATE
FILMED
11-81
DTIC

LEVEL ⁴

MISSOURI-NEMAHA-NODAWAY BASIN



AL A105649

WELTON IDEKER DAM

HOLT COUNTY, MISSOURI

MO. 11010

**PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**

DTIC FILE COPY



**United States Army
Corps of Engineers**

*... Serving the Army
... Serving the Nation*

St. Louis District

**DTIC
ELECTE
OCT 16 1981**

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

81 10 15

MAY, 1979

DISTRIBUTION STATEMENT A

**Approved for public release;
Distribution Unlimited**

UNCLASSIFIED

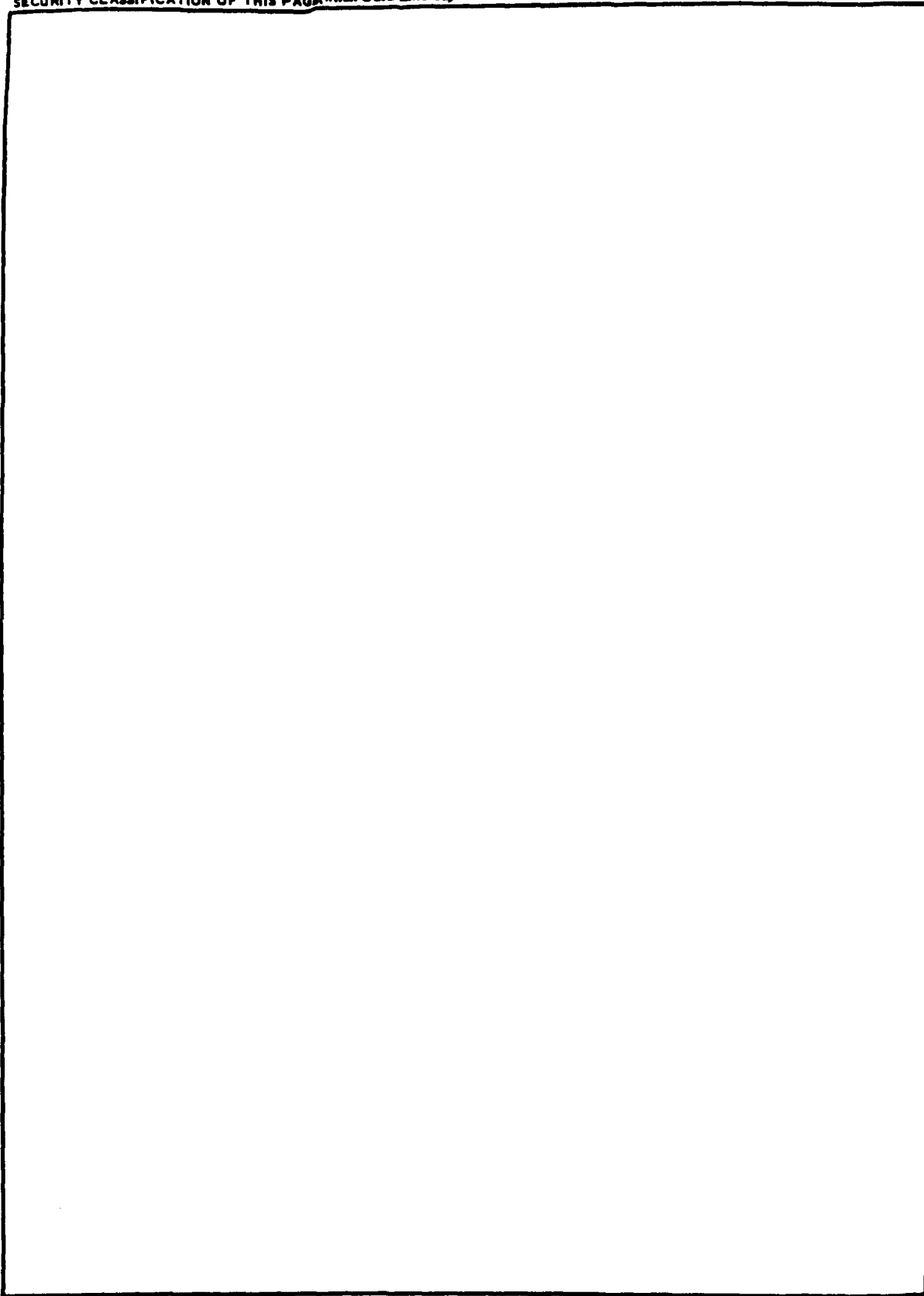
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. <i>AD A105649</i>	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Welton Ideker Dam (MO 11010) Holt County, Missouri		5. TYPE OF REPORT & PERIOD COVERED Final Report
7. AUTHOR(s) Hoskins-Western-Sonderegger, Inc.		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101		8. CONTRACT OR GRANT NUMBER(s) DACW43-79-C-0046
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE May 1979
		13. NUMBER OF PAGES Approximately 70
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety, Lake, Dam Inspection, Private Dams		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.		

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)



SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

WELTON IDEKER DAM
HOLT COUNTY, MISSOURI
MISSOURI INVENTORY NO. 11010

9 Final rept.,

15 DACW43-79-C-0046

10 Rey S. /Decker Gordon G. /Jamison
Garold /Ulmer Harold P. /Hoskins

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Welton Ideker Dam (MO 11010),
Missouri - Nemaha - Nodaway Basin,
Holt County, Missouri. Phase I Inspection
Report.

PREPARED BY
HOSKINS-WESTERN-SONDEREGGER, INC.
CONSULTING ENGINEERS
LINCOLN, NEBRASKA

UNDER DIRECTION OF
ST. LOUIS DISTRICT, CORPS OF ENGINEERS

FOR

GOVERNOR OF MISSOURI

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability	
Dist	Special
A	

11 MAY 1979

DTIC
ELECTE
OCT 16 1981
S D



DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

LMSD-P

21 February 1980

SUBJECT: Welton Ideker Dam Phase I Inspection Report

This report represents the results of a field inspection and evaluation of the Welton Ideker Dam (MO 11010).

It was prepared under the National Program of Inspection of non-Federal Dams.

This dam has been classified as an unsafe, emergency by the St. Louis District because of slides and erosion on the downstream slope at the left and right abutments. Other unsafe conditions are:

- a. Spillway will not pass 50 per-cent of the Probable Maximum Flood without overtopping, which is seriously inadequate.
- b. Severe erosion on the upstream slope and on the crest at both abutments.
- c. Seepage on the downstream slope at both abutments of the dam and at the right abutment along the toe.

SIGNED

SUBMITTED BY:

Chief, Engineering Division

21 MAR 1980

Date

SIGNED

APPROVED BY:

Colonel, CE, District Engineer

21 MAR 1980

Date

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

TABLE OF CONTENTS

<u>PARAGRAPH NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
	Assessment Summary	
	Overview Photograph	
	SECTION 1 - PROJECT INFORMATION	
1.1	General	1
1.2	Description of Project	1
1.3	Pertinent Data	3
	SECTION 2 - ENGINEERING DATA	
2.1	Design	5
2.2	Construction	5
2.3	Operation	5
2.4	Evaluation	5
	SECTION 3 - VISUAL INSPECTION	
3.1	Findings	6
3.2	Evaluation	8
	SECTION 4 - OPERATIONAL PROCEDURES	
4.1	Procedures	9
4.2	Maintenance of Dam	9
4.3	Maintenance of Operating Facilities	9
4.4	Description of Any Warning System in Effect	9
4.5	Evaluation	9
	SECTION 5 - HYDRAULIC/HYDROLOGIC	
5.1	Evaluation of Features	10
	SECTION 6 - STRUCTURAL STABILITY	
6.1	Evaluation of Structural Stability	12
	SECTION 7 - ASSESSMENT/REMEDIAL MEASURES	
7.1	Dam Assessment	13
7.2	Remedial Measures	13

APPENDIX A - MAPS

Plate A-1	Vicinity Topography
Plate A-2	Location Map

APPENDIX B - PHOTOGRAPHS

Plate B-1	Photo Index
Plate B-2 through Plate B-8	Photo No. 2 through Photo No. 15

APPENDIX C - PROJECT PLATES

Plate C-1	Phase I - Plan and Centerline Profile of Dam
Plate C-2	Phase I - Section of Dam

APPENDIX D - HYDRAULIC AND HYDROLOGIC DATA

Plates D-1 & D-2	Hydrologic Computations
Plate D-3	Area Capacity Curves
Plate D-4	Spillway Rating Curve
Plate D-5	Ratio-Discharge Curves
Plates D-6 through D-17	Computer Input and Output for Ratios of PMF
Plates D-18 through D-34	Computer Input and Output for 10-year Flood

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
ASSESSMENT SUMMARY

Name of Dam	Welton Ideker Dam
State Located	Missouri
County Located	Holt County
Stream	Tributary to Little Tarkio Creek
Date of Inspection	May 17, 1979

Welton Ideker Dam was inspected by an interdisciplinary team of engineers, ~~from Hoskins Western-Sonderregger, Inc.~~ The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers. Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. Failure would threaten life and property. The estimated damage zone extends approximately one mile downstream of the dam. Within the damage zone are one dwelling and Interstate Highway I-29.

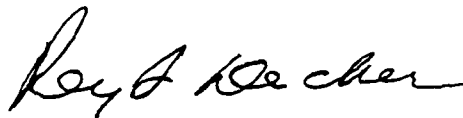
Our inspection and evaluation indicates that the spillway does not meet the criteria set forth in the recommended guidelines for a small dam having a high hazard potential. Considering the small volume of water impounded, the nature of the downstream channel and the hazards involved, one-half of the Probable Maximum Flood is the appropriate spillway design flood. The spillway will not pass the 100-year flood (flood having a one percent chance of being exceeded in any year) without overtopping the dam. The spillway will pass 9% of the Probable Maximum Flood as well as the 10-year flood without overtopping the dam. The Probable Maximum Flood (PMF) is defined as the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

No design data were available for this dam. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These analyses should be obtained in the future. This dam is in poor condition structurally. In addition it appears to have a very serious potential of failure from minor overtopping and/or piping.

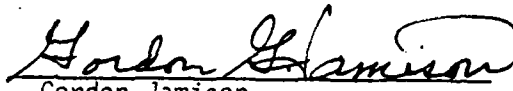
1

Recommendations presented in Section 7 of this report relative to either rehabilitating the existing dam or to constructing a new dam downstream from the existing dam should be pursued on a high priority basis.

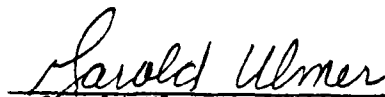
Maintenance of this dam has been neglected.



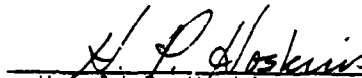
Rey S. Decker
E-3703



Gordon Jamison



Garold Ulmer
E-4777



Harold P. Hoskins
Chairman of Board
Hoskins-Western-Sonderegger, Inc.
E-8696



PHOTO NO. 1 - OVERVIEW

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
WELTON IDEKER DAM - MO 11010
HOLT COUNTY, MISSOURI

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection of Welton Ideker Dam be made.
- b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.
- c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams," Appendix D to "Report of the Chief of Engineers on the National Program of Inspection of Dams" dated May, 1975, and published by the Department of the Army, Office of the Chief of Engineers.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances.
 - (1) The dam is an earth fill about 185 feet in length and 34.2 feet in height located in the deeply incised loess hills of northwestern Missouri.
 - (2) The spillway consists of a 36 inch diameter CMP drop inlet riser connected with a 36 inch CMP outlet conduit passing through the embankment. The drop inlet is inclined at about a 45° angle from vertical.

- (3) There is no evidence to indicate the existence of an emergency spillway.
- (4) Pertinent physical data are given in paragraph 1.3 below.
- b. Location. The dam is located in the northwestern part of Holt County, Missouri, as shown on Plate A-2. The dam is shown on Plate A-1 in the NW $\frac{1}{4}$ of Section 35, T63N, R40W. The lake formed behind the dam is shown in the NW $\frac{1}{4}$ of Section 35, T63N, R40W.
- c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. Based on these criteria, this dam and impoundment is in the small size category.
- d. Hazard Classification. Guidelines for determining hazard classification are presented in the same guidelines as referenced in paragraph 1.1c above. Based on these guidelines, this dam is in the High Hazard Classification. The estimated damage zone extends approximately one mile downstream of the dam. Within the damage zone are one dwelling and Interstate Highway I-29.
- e. Ownership. The dam is owned by Ideker Farms, Inc., Welton Ideker, President, Box 187, Mound City, Missouri 64470. Tenant is Mr. Don Burke.
- f. Purpose of Dam. The dam was constructed as an erosion control (gully erosion) and grade stabilization structure.
- g. Design and Construction History. It was reported by the tenant, Mr. Burke, that the dam was constructed prior to 1962. In or about 1969 the riser for the spillway was extended 5 feet in elevation because sediment had filled the reservoir to the inlet elevation of the original spillway. Some additional fill was placed on the crest of the dam at that time.
- h. Normal Operating Procedure. There are no controlled operating facilities for this dam. The pool level is controlled by rainfall, infiltration, evaporation, and the capacity of the uncontrolled spillway.

1.3 PERTINENT DATA

- a. Drainage Area. 0.234 sq. mi. (149.5 acres)
- b. Discharge at Damsite.
 - (1) All discharge at the damsite is through a 36 inch CMP drop inlet pipe (canted at approximately 45°) which connects to a 36 inch CMP conduit outlet pipe.
 - (2) Estimated maximum flood - Unknown
 - (3) The spillway capacity varies from 0 c.f.s. at elevation 945.0 ft. to 50 c.f.s. at elevation 948.2 (current bottom of washout on crest of dam).
 - (4) There is no emergency spillway.
 - (5) Total spillway capacity at the minimum top of dam is 50 c.f.s.±.
- c. Elevations. (Feet above M.S.L.)
 - (1) Top of dam (low point) - 948.2
 - (2) Principal spillway crest - Lower lip of pipe = 945.0 (assumed)
 - (3) Emergency spillway crest - None
 - (4) Streambed at centerline - 914±
 - (5) Maximum tailwater - Unknown
- d. Reservoir. Length (feet) of maximum pool - 900±
- e. Storage (Acre-feet).
 - (1) Top of dam - 37±
 - (2) Principal spillway crest - 22±
- f. Reservoir Surface (Acres).
 - (1) Top of dam - 5±
 - (2) Principal spillway crest - 4±
- g. Internal drainage system - unknown.

h. Dam.

- (1) Type - earth fill
- (2) Length - 185 feet \pm
- (3) Height - 34.2 feet \pm
- (4) Top width - 11 to 18 feet
- (5) Side slopes.
 - (a) Downstream 1.7+H to 1V
 - (b) Upstream - exposed is near vertical
- (6) Zoning - unknown
- (7) Impervious core - unknown
- (8) Cutoff - unknown
- (9) Grout curtain - unknown
- (10) Wave protection - none

i. Diversion Channel and Regulating Tunnel. None

j. Spillway.

- (1) Principal (and only)
 - (a) Type - uncontrolled, drop inlet, 36 inch corrugated metal pipe riser with 36 inch CMP conduit. The riser is inclined at about 45° off of vertical.
 - (b) Crest (invert) elevation - lip elevation = 945+ (assumed)
Outlet - 914 feet \pm
 - (c) Length - 128 feet \pm

k. Regulating Outlets. None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data were available for this dam.

2.2 CONSTRUCTION

No construction data were available. It was reported by the tenant, Mr. Don Burke, that the dam was built prior to 1962.

2.3 OPERATION

No data were available on spillway operation.

2.4 EVALUATION

- a. Availability. No data were available.
- b. Adequacy. The field surveys and visual observations presented herein are considered adequate to support the conclusions of this report. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.
- c. Validity. Not applicable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

- a. General. A visual inspection of the Ideker Dam was made on May 17, 1979. Engineers from Hoskins-Western-Sonderegger, Inc., Lincoln, Nebraska making the inspection were: R.S. Decker, Geotechnical; Gordon Jamison, Hydrology; Garold Ulmer, Civil Engineer. The owner was not present during the inspection.
- b. Dam.
 - (1) Geology and Soils (Abutment and Embankment). Soils in the area consist of deep silty loess. Material resembling CL-CH glacial till was observed at the base of the right abutment (Photo No. 12). Materials in the embankment were apparently borrowed from the valley sides and consist of low plasticity silts (ML-CL). This dam is located in a deeply incised gully eroded through loessial alluvium and colluvium typical of the area. Abutments for the dam would be formed by the almost vertical banks of the eroded channel.
 - (2) Upstream Slope. The exposed upstream slope is very irregular and badly eroded to a near vertical slope. It is sparsely vegetated with grass and weeds. There is no erosion protection.
 - (3) Crest. The crest is well vegetated with adapted grasses. It is very irregular in profile and alignment. Surface runoff from both abutments has eroded gullies across the crest on both ends of the dam. It appears that a reservoir level exceeding elevation 948 could rapidly erode through and cause a breach on the left end of the dam (Sta. 0+50+).
 - (4) Downstream Slope. The downstream slope has slipped or slumped on the left end and is almost vertical between stations 0+30 to 0+95+. Slides and slips are also evident in the right abutment trough. The slope is well vegetated with grass. A few small trees are growing along the toe of the dam. Seepage outcrops on the left abutment and the slope of the left end (Station 0+50+) of the dam, about 12 feet below the top of the

dam, which probably accounts for the slides in this area. Seepage also outcrops on the right end and along the toe of the dam. All seepage was clear with total discharge from the left seep area estimated at 0.5 to 0.75 gal/min. Seepage discharge from the right end is estimated at 0.25 to 0.5 gal/min.

- (5) Miscellaneous. The soils in the embankment and abutments, and the present condition of the crest and side slopes, would indicate that any overtopping of this structure would cause very serious damage and probable breaching.

c. Appurtenant Structures.

- (1) The present spillway inlet consists of a 5 foot \pm extension added to the original inlet after the reservoir silted full. The outlet section of the pipe has separated so that the last (downstream) 15 foot segment is not connected with the conduit, and spillway discharges flow under the outfall pipe. Photo No. 7 shows the displaced segment in the foreground with the present outlet in the extreme upper right corner of the picture.
- (2) There is no effective emergency spillway for this dam. There is an excavated channel through the right abutment that appears to have been intended as a spillway. However, measurements indicate that the dam crest is lower than the intended spillway. An old roadway enters the structure area from the southwest. Surface runoff from the right abutment is collected by this roadway, flows into the reservoir, and has eroded an active gully that dissects about one half of the embankment-abutment contact on the right end of the structure (see Photos No. 2, 6 and 15).
- (3) Drawdown Facilities. There are no drawdown facilities for this dam.

- d. Reservoir Area. The reservoir area consists of the old eroded channel section. It was reported by the tenant, Mr. Burke, that the reservoir filled with sediment to the original principal spillway level about 10 years ago, at which time the spillway crest elevation was raised about 5 feet. Gullies entering the reservoir are eroded and slumping.

- e. Downstream Channel. The downstream channel is overgrown with trees and shrubs.

3.2 EVALUATION

This structure is in very poor condition and appears to have serious potential of failure. As discussed previously, if the reservoir level approaches minimum top of dam elevation, it will probably result in rapid failure of the structure. The outlet conditions of the pipe spillway are also conducive to severe erosion under sustained flows.

However, if the reservoir is full of silt, and it appears to be, the five foot + flood wave that would be generated by breaching the dam should soon be dissipated in the tree filled downstream channel.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no controlled outlet works for this dam. The pool level is controlled by rainfall, infiltration, evaporation, and the capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM

There apparently has been very little if any maintenance on this structure. Mr. Ideker indicated that it is probably not worth repairing and that he is contemplating constructing a new dam downstream of this one.

4.3 MAINTENANCE OF OPERATING FACILITIES

No operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

There is no warning system in effect for this dam.

4.5 EVALUATION

There appears to be a serious potential of failure of this structure.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

- a. Design Data. No design data were found for this dam.
- b. Experience Data. The drainage area, reservoir surface area, and elevation-storage data were developed from the USGS Corning, Missouri 7 1/2 minute topographic quadrangle map. The hydraulic computations for the spillway and dam overtopping discharge ratings were based on data collected in the field at the time of the field inspection.
- c. Visual Observations.
 - (1) The spillway riser was not accessible for inspection. Mr. Burke, the tenant, indicated an extension had been added to the riser approximately ten years ago. The downstream section of the outlet conduit has broken off and serves no purpose. Considerable rehabilitation needs to be done.
 - (2) The crest and upstream and downstream faces of the dam are all badly eroded and need immediate attention.
- d. Overtopping Potential. The spillway is too small to pass 50% of the probable maximum flood without overtopping. The spillway is too small to pass the 100-year flood. The spillway will pass 0.09 PMF without overtopping the dam. Any overtopping of the dam would undoubtedly cause rapid erosional failure of the dam. The results of the routings through the dam are tabulated in regards to the following conditions:

<u>Frequency</u>	<u>Inflow Discharge c.f.s.</u>	<u>Outflow Discharge c.f.s.</u>	<u>Maximum Pool Elevation</u>	<u>Freeboard Top of Dam Min.Elev. 948.2</u>	<u>Time Dam Overtopping Hr.</u>
10-yr.	300	43	947.77	0.5	-
100-yr.	570	82	950.1	- 1.9	5-
1/2 PMF	1280	1090*	952.5	- 4.3	9
PMF	2550	2320	953.9	- 5.7	14+
.09 PMF	230	50	948.2	0	-

*Spillway discharge = 85 c.f.s., Top-of-dam discharge=1,005 c.f.s.

According to the recommended guidelines from the Department of the Army, Office of the Chief of Engineers, this dam is classified as having a high hazard rating and a small size. Therefore, the 1/2 PMF to PMF is the test for the adequacy of the dam and its spillway.

The estimated damage zone is described in Paragraph 1.2d in this report.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observation. The dam does not appear to be structurally stable and is certainly not erosionally stable. Full reservoir pressures could result in increased seepage and failure by piping. Any overtopping would undoubtedly cause rapid erosional failure of the dam.
- b. Design and Construction Data. No design or construction data were available. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.
- c. Operating Records. There are no controlled operating facilities for this dam.
- d. Post Construction Changes. The increase in principal spillway crest elevation was discussed in Sections 1 and 3 of this report.
- e. Seismic Stability. This dam is located in Seismic Zone 1. An earthquake of the magnitude predicted in this area might cause structural failure of this dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

- a. Safety. This structure appears to have a very serious potential of failure which could result from minor overtopping and/or piping due to full reservoir loading. The dam is not considered to be structurally stable as evidenced by the condition of the downstream slope. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.
- b. Adequacy of Information. Due to the lack of engineering data, the conclusions in this report are based upon performance history and visual observations. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.
- c. Urgency. Because of the serious potential of failure by minor overtopping, the questionable condition of the spillway, the eroded condition of both abutments and the slides in the downstream slope, the actions recommended in paragraphs 7.2.a.(1) and (2) should be pursued on a high priority basis.
- d. Necessity for Phase II. Phase II investigation is not considered necessary.
- e. Seismic Stability. This dam is located in Seismic Zone 1. An earthquake of this magnitude could be hazardous to this dam.

7.2 REMEDIAL MEASURES

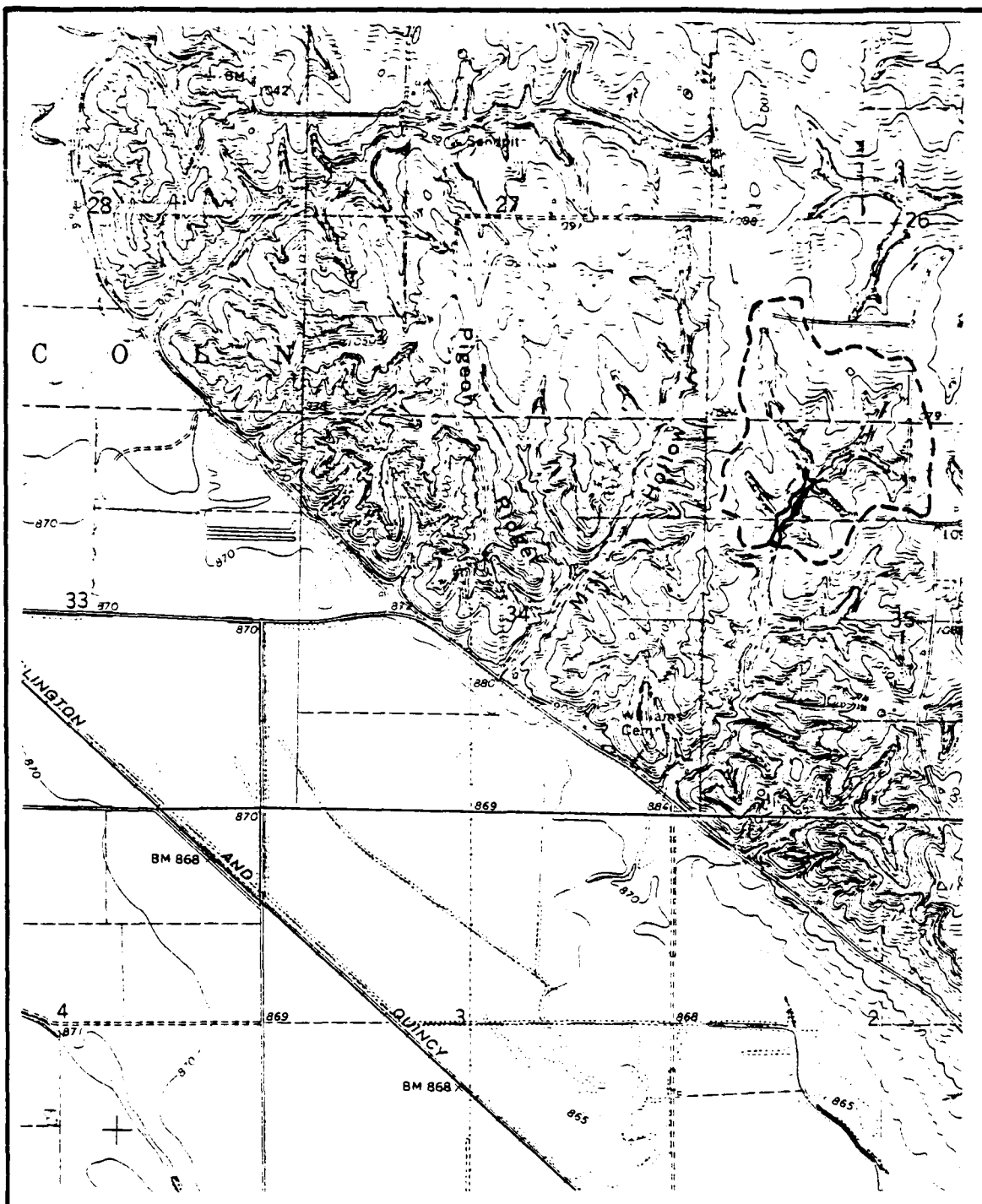
- a. Alternatives.
 - (1) The services of an engineer experienced in the design and construction of earth dams should be obtained to evaluate the cost/benefit relationships of rehabilitating this structure, as compared to constructing a new dam downstream of the existing dam.

- (2) Based on the above evaluation, the engineer shall increase the height of the dam and/or the size of the spillway of the present dam in order to pass one-half the probable maximum flood without overtopping, or shall design a new dam downstream which will be structurally stable, will provide a reservoir for sedimentation and will pass one-half of the probable maximum flood through its spillway system without overtopping.

b. O & M Procedures.

- (1) The existing dam is in such condition that normal maintenance problems take second place to rehabilitation of the dam.
- (2) A regular program of inspection and maintenance should be initiated with either a rehabilitated dam or a new dam.

APPENDIX A
MAPS



Scale in feet
 2000 1000 0 2000 4000
Contour Interval - 10'



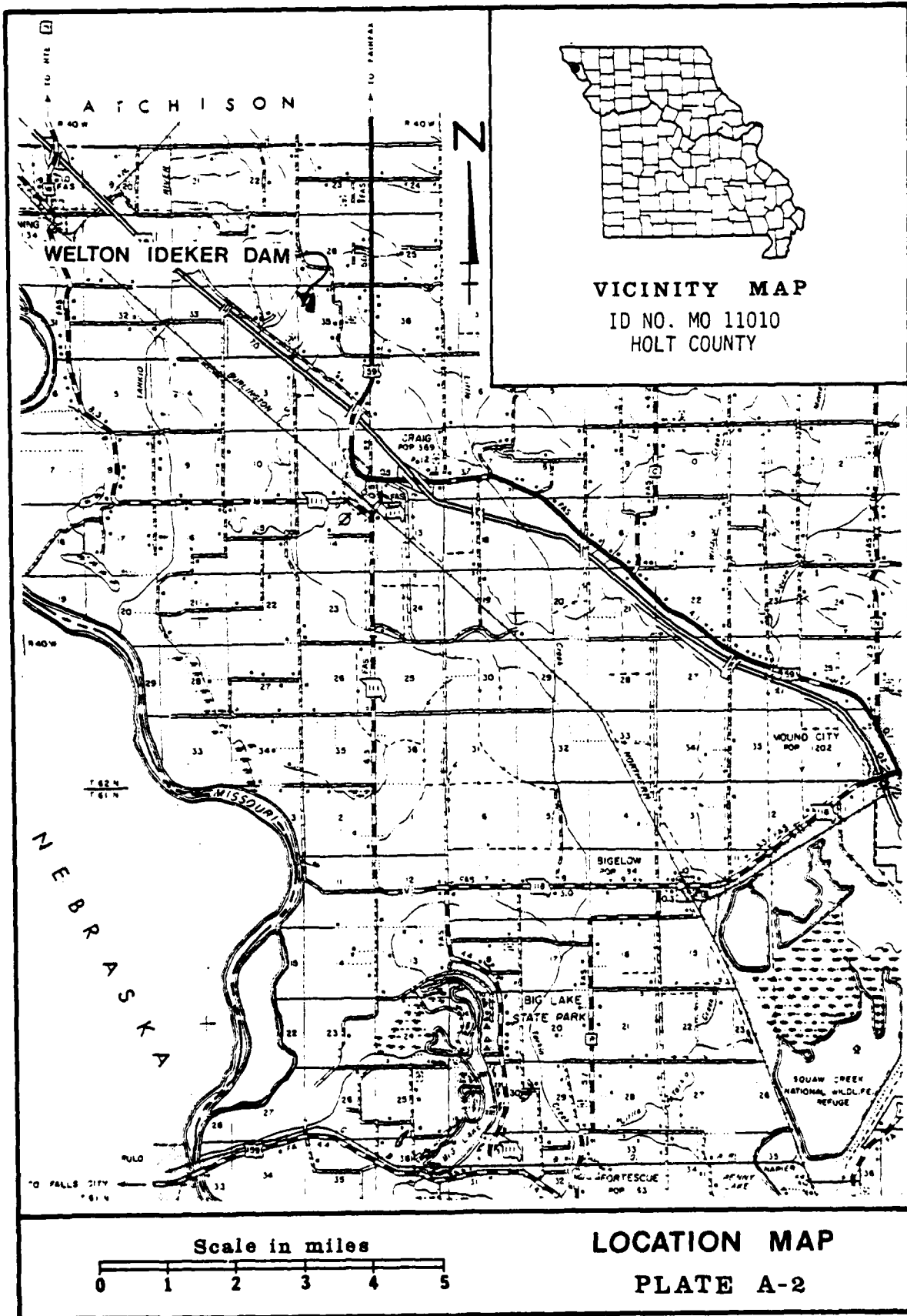
VICINITY TOPOGRAPHY

WELTON IDEKER DAM

HOLT COUNTY, MISSOURI

MO. 11010

PLATE A-1



APPENDIX B
PHOTOGRAPHS

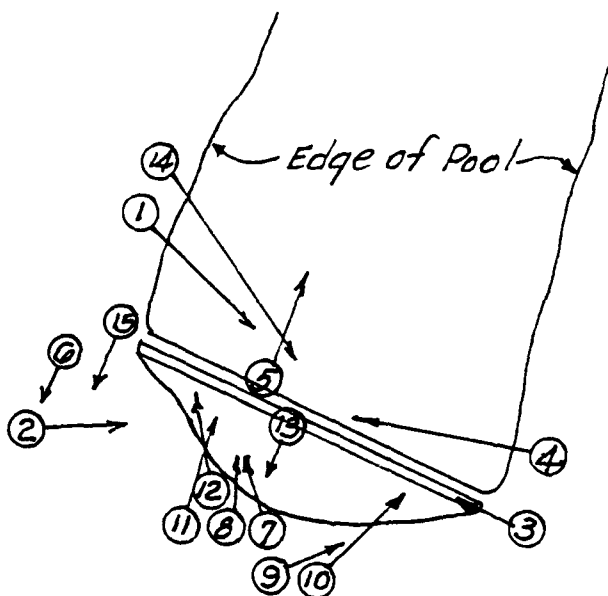


PHOTO INDEX

WELTON IDEKER DAM

HOLT COUNTY, MISSOURI

MO. 11010

PLATE B-1



PHOTO NO. 2 - OVERVIEW TAKEN FROM DOWNSTREAM ON RIGHT SIDE.



PHOTO NO. 3 - CREST TAKEN FROM LEFT ABUTMENT. NOTE GULLY
ERODED IN CREST.



PHOTO NO. 4 - UPSTREAM SLOPE TAKEN FROM LEFT SIDE.



PHOTO NO. 5 - VIEW UPSTREAM FROM STA. 1+00. SPILLWAY
RISER IN CENTER.



PHOTO NO. 6 - VIEW OF OLD ROADWAY LOOKING TO SOUTHWEST
FROM APPROX. DAM CENTERLINE. NOTE EROSION.



PHOTO NO. 7 - OUTLET
SECTION OF SPILLWAY PIPE.
SECTION IS DISCONNECTED
FROM PIPE THROUGH DAM.
SURVEY ROD IN UPPER RIGHT
IS AT END OF PIPE THROUGH DAM



PHOTO NO. 8 - VIEW OF
OUTLET END OF SPILLWAY
PIPE AT ROD LOCATION.
NOTE AREA OF SLIDE.



PHOTO NO. 9 - SLIDE AREA IN LEFT ABUTMENT.



PHOTO NO. 10 - VIEW UPSTREAM LOOKING AT DOWNSTREAM FACE.



PHOTO NO. 11 - VIEW UPSTREAM LOOKING AT DOWNSTREAM FACE.



PHOTO NO. 12 - SLIDE AND EROSION AREA IN RIGHT ABUTMENT.



PHOTO NO. 13 - VIEW DOWNSTREAM FROM STA. 0+75.

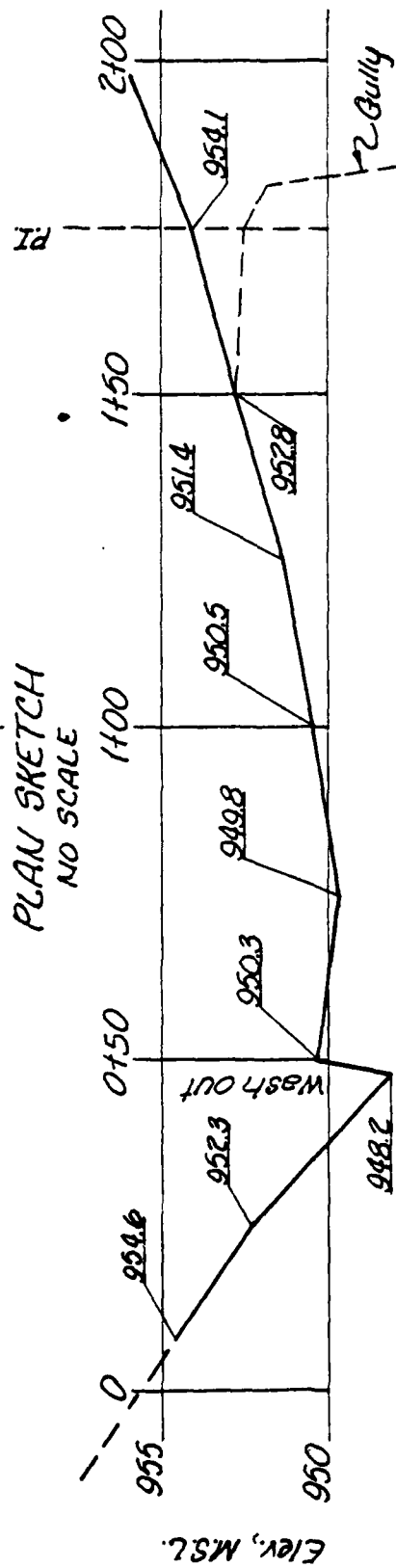
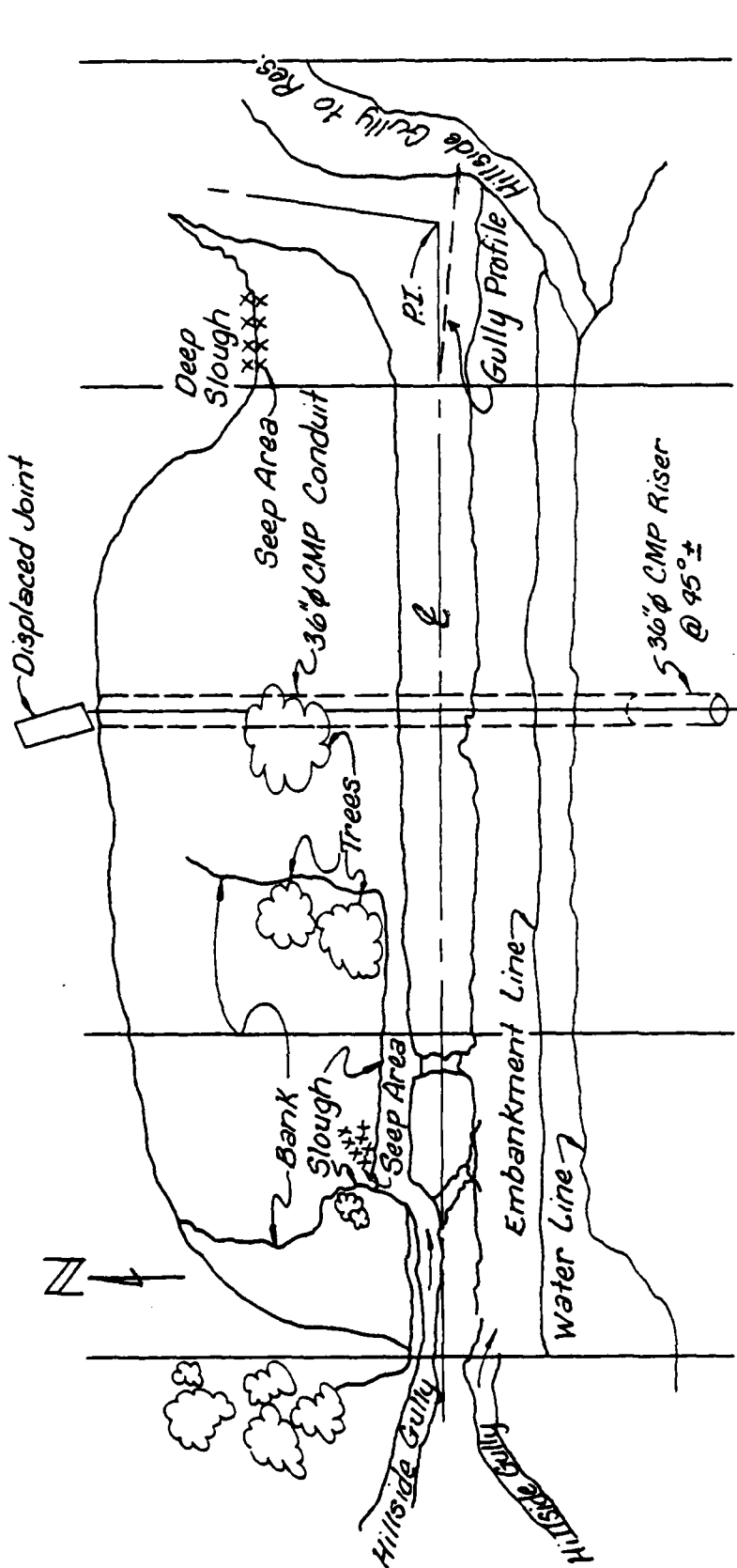


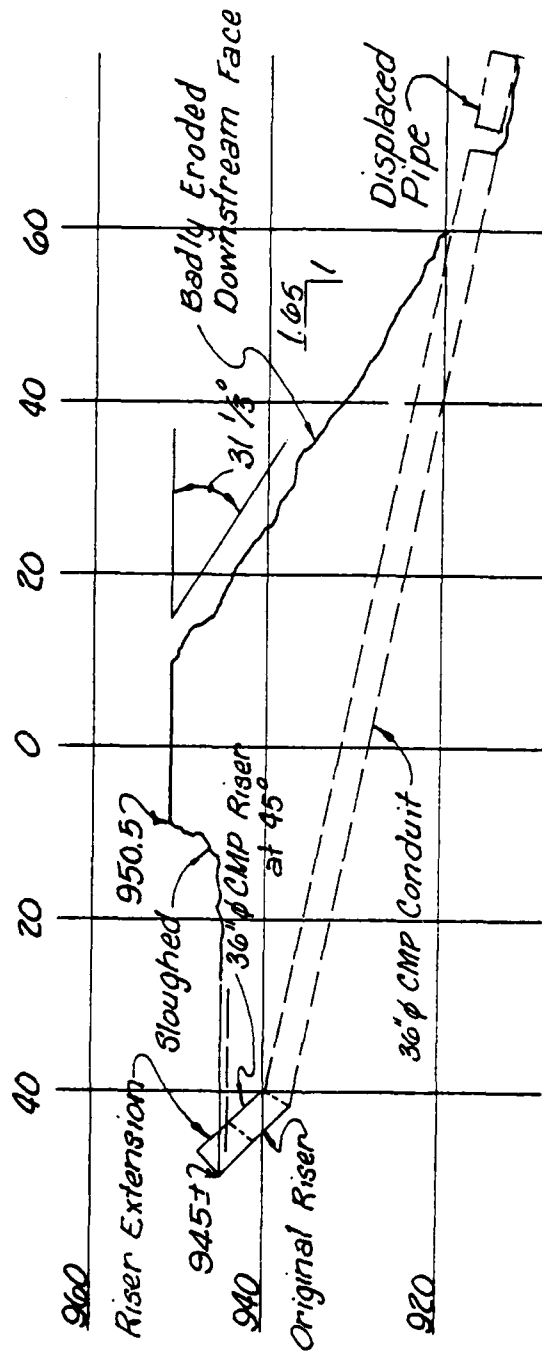
PHOTO NO. 14 - VIEW OF
SPILLWAY RISER.



PHOTO NO. 15 - VIEW LOOKING DOWNSTREAM FROM RIGHT SIDE.
MEN STANDING ON CREST.

APPENDIX C
PROJECT PLATES





DAM SECTION (STA. 1+00)
Scale: 1" = 20' (H. & V.)

APPENDIX D
HYDRAULIC AND HYDROLOGIC DATA

HYDROLOGIC COMPUTATIONS

1. The SCS dimensionless unit hydrograph and the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Corps of Engineers, Davis, California, were used to develop the inflow hydrographs.
 - a. Twenty-four hour, 100-year rainfall for the dam location was taken from the data for the rainfall station at Maryville, MO. as supplied by the St. Louis District, Corps of Engineers per their letter dated 6 March 1979. The twenty-four hour probable maximum precipitation was taken from the curves of Hydrometeorological Report No. 33 and current Corps of Engineers and St. Louis policy and guidance for hydraulics and hydrology.
 - b. Drainage area = 0.23 square miles (149.5 acres).
 - c. Time of concentration of runoff = 15 minutes (computed from "Kirpich" formula).
 - d. The antecedent storm conditions for the probable maximum precipitation were heavy rainfall and low temperatures which occurred on the previous 5 days (SCS AMC III). The antecedent storm conditions for the 100-year precipitation were an average of the conditions which have preceded the occurrence of the maximum annual flood on numerous watersheds (SCS AMC II). The initial pool elevation was assumed at the invert of the 36 inch \emptyset CMP riser.
 - e. The total twenty-four hour storm duration losses for the 100-year storm were 3.5 inches. The total losses for the PMF storm were 2.2 inches. These data are based on SCS runoff curve No. 84 and No. 69 for antecedent moisture conditions SCS AMC III and AMC II, respectively. The watershed is composed of primarily SCS soil group B (Knox and Marshall silt-loam soils) and consists mostly of grass and cropland planted on the contour (60%) and wooded areas on the side slopes (40%).
 - f. Average soil loss rates = 0.10 inch per hour approximately.

2. The discharge rating for the principal spillway was developed using equations for orifice and weir flow. They are as follows:

a. Orifice flow equation ($Q = CA\sqrt{2gH}$)

where C= orifice coefficient = 0.6

A= area of opening, $\text{ft}^2 = 7.07$

H= Total head, ft.

b. Weir flow equation ($Q_w = CLH^{3/2}$)

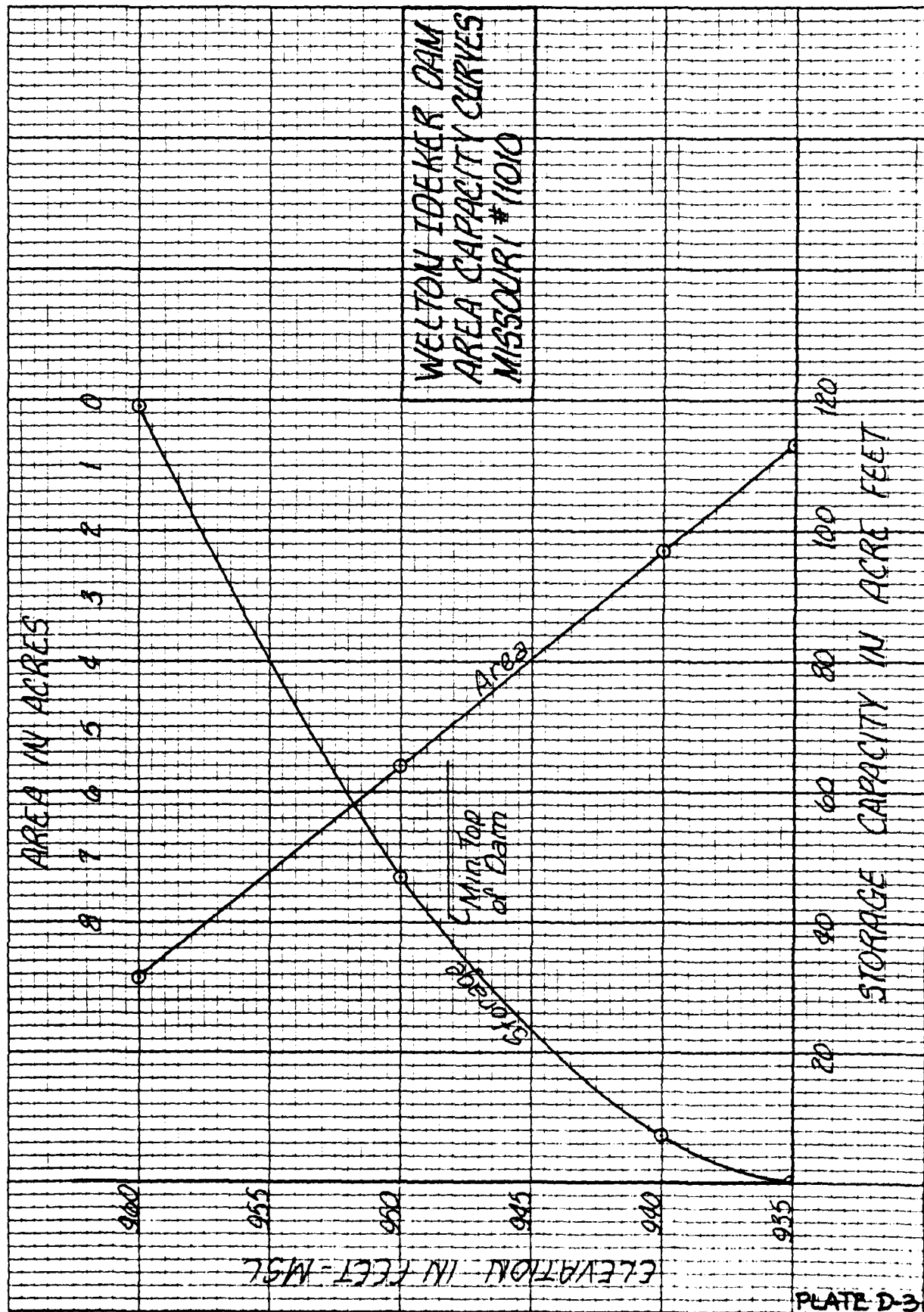
where C= weir coefficient = 3.3+

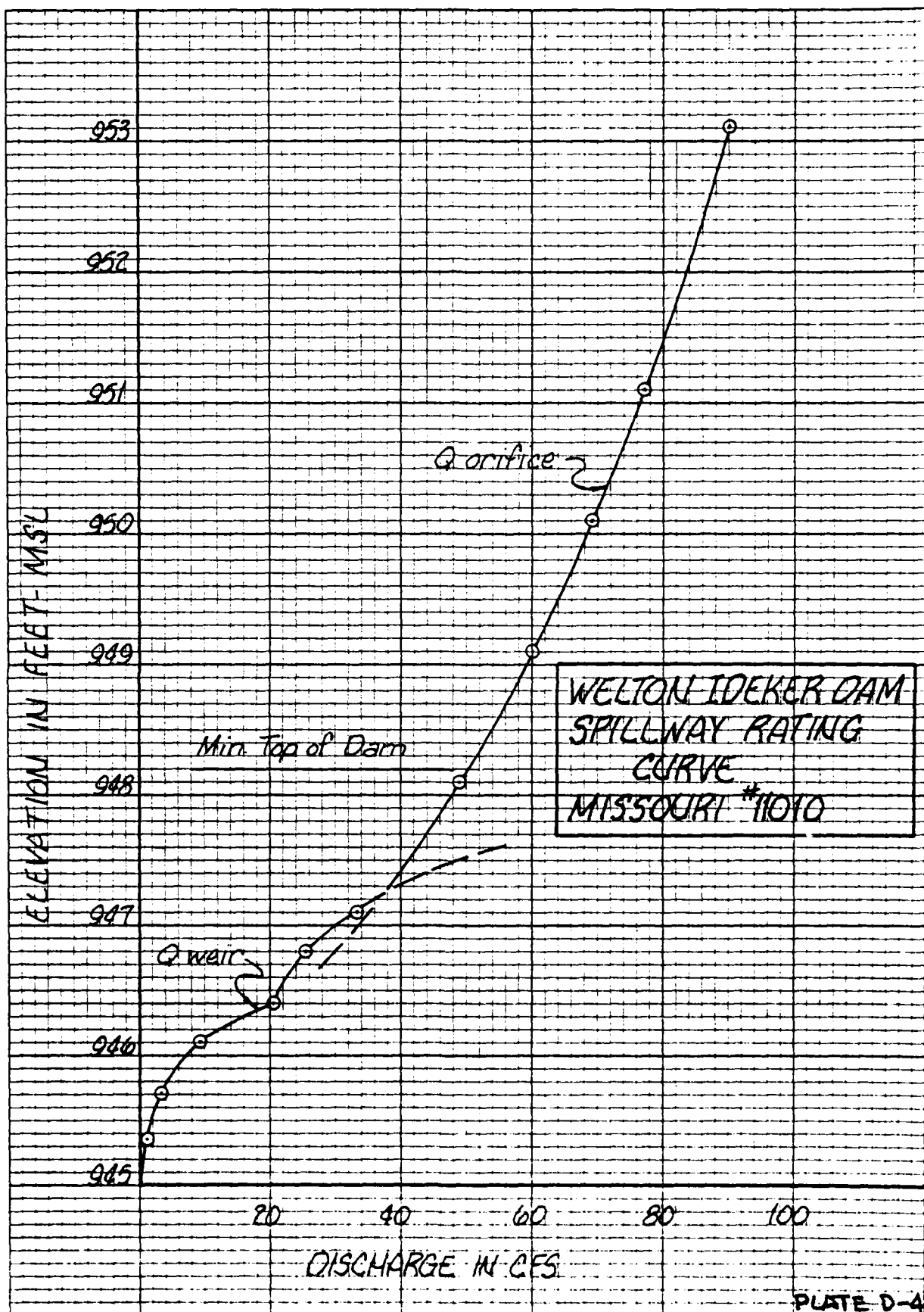
L= length of weir, ft. = arc length of 36" CMP
varied with depth.

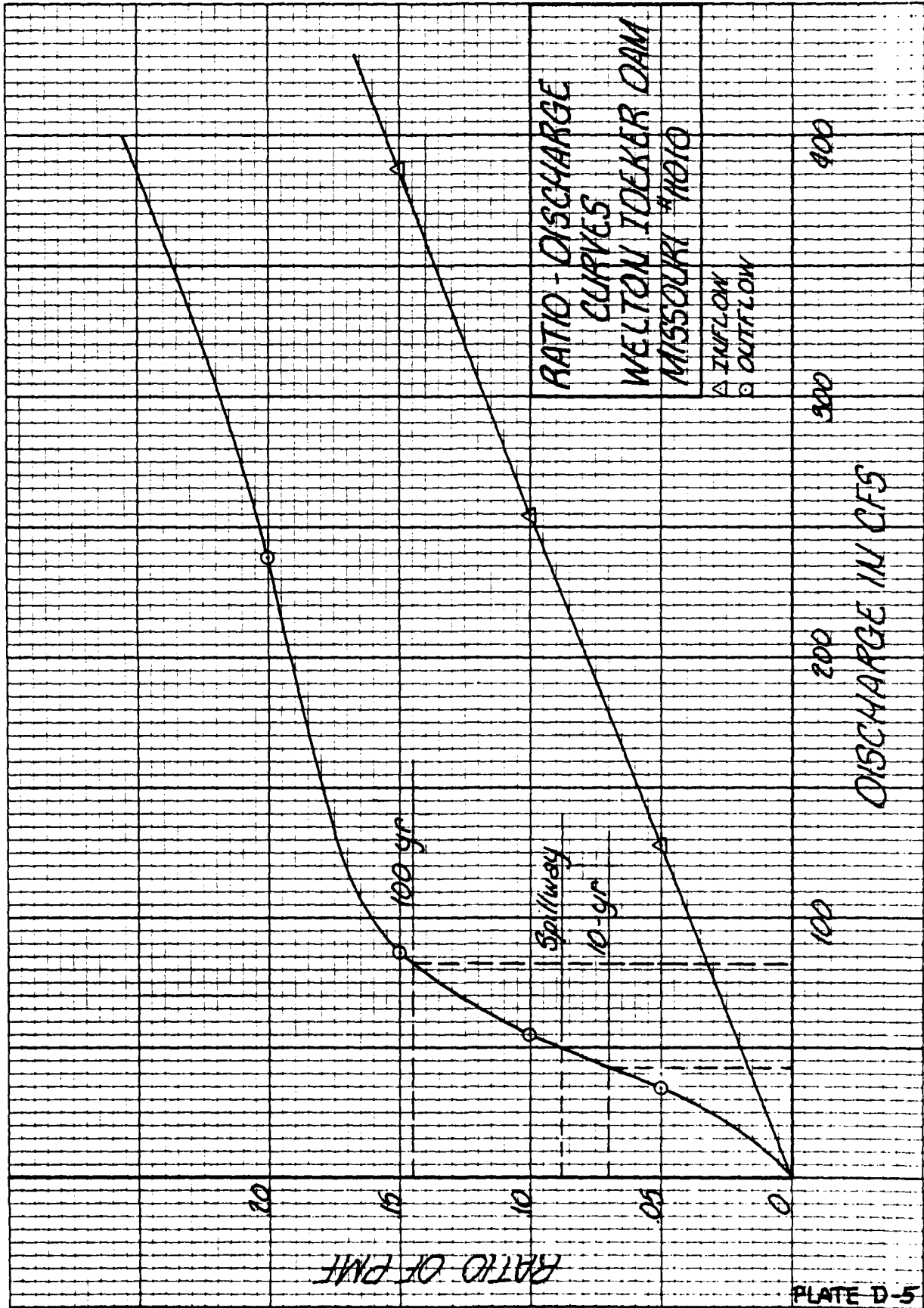
H= total head, ft.

The flows over the dam crest were developed using the HEC-1 (Dam Safety Version) program with a discharge coefficient of 2.9 and a value of 1.5 for the exponent of head.

3. Floods were routed through the reservoir using the HEC-1 (Dam Safety Version) program to determine the capabilities of the spillway and dam embankment crest.







 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

RUN DATE= 79/11/26:
 TIME= 18.22.25.

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
 HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF IDEKER DAM -110100
 RATIOS OF PMF ROUTED THROUGH THE RESERVOIR

JOB SPECIFICATION									
NQ	MHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPAT	NSTAN
288	0	5	0	0	0	0	0	3	0
	JUPER		5			TRACE			
				0	0				

MULTI-PLAN ANALYSES TO BE PERFORMED
 NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= .05 .10 .15 .20 .35 .50 .65 .80 1.00

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO RES NO 11010

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
000001	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

INYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	.23	0.00	.23	1.00	0.0000	0	1	0

PRECIP DATA

SPEE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.70	102.00	121.00	130.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLIKR	RTIOL	ERAIN	STRKS	RTIUK	STRIL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-84.00	0.00	0.00

CURVE NO = -84.00 WEINNESS = -1.00 EFFECT CN = 84.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= .17

RECESSION DATA

SIRTO= 0.00 QRCN= -.01 RTIOR= 1.00

UNIT HYDROGRAPH 12 END OF PERIOD ORIGINATES, TC= 0.00 HOURS, LAG= .17 VOL= 1.00
 162. 491. 505. 317. 159. 85. 45. 23. 12. 7.
 4. 1.

END-OF-PERIOD FLOW

0

CMS 58. 13. 4. 4. 1173.
 INCHES 18.84 22.87 22.87
 MM 478.42 580.89 580.89
 AC-FT 235. 282. 282.
 THOUS CU M 290. 352. 352.

HYDROGRAPH AT STA00001 FOR PLAN 1, [REDACTED]

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME
 CFS 2551. 592. 180. 180. 51776.
 CMS 72. 17. 5. 5. 1566.
 INCHES 23.54 28.59 28.59 28.59
 MM 598.02 726.11 726.11 726.11
 AC-FT 234. 357. 357. 357.
 THOUS CU M 362. 440. 440. 440.

HYDROGRAPH ROUTING

ROUTED FLOWS THRU RES NO 11010

ISTAQ	ICOMP	JECN	ITAPE	JPLT	JPR1	INAME	ISTAGE	IAUTO
000002	1	0	0	2	0	1	0	0

QLOSS	CLOSS	AVG	TRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	

NSTPS	NSTOL	LAG	ANSKK	X	ISK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-945.	-1

STAGE	945.00	945.40	945.70	946.10	946.40	946.80	947.10	948.10	949.10	950.10
	951.10	953.10	956.10							

FLOW	0.00	4.00	9.00	20.00	25.00	33.00	49.00	60.00	69.00
	77.00	111.00							

CAPACITY= 0. 1. 2. 4. 7. 13. 19. 31. 46. 79.

ELEVATION= 935. 936. 937. 938. 940. 942. 944. 947. 950. 955.

CREL	SPMID	COQM	EXPW	ELEV	COQL	CAREA	EXPL
945.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DANWID
948.2	2.9	1.5	201.

CREST LENGTH 11. 53. 65. 96. 115. 128. 163. 201.
 AT OR BELOW ELEVATION 949.8 950.3 950.5 951.4 952.3 952.8 954.1 956.0

STATION 000002, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORIGINATES

[illegible]

•UVF•

STATION000002

	0.	200.	400.	600.	800.	1000.	1200.	1400.	0.	0.	0.	0.
0.05	11											
0.10	21											
0.15	31											
0.20	41											
0.25	51											
0.30	61											
0.35	71											
0.40	81											
0.45	91											
0.50	101											
0.55	111											
1.00	121											
1.05	131											
1.10	141											
1.15	151											
1.20	161											
1.25	171											
1.30	181											
1.35	191											
1.40	201											
1.45	211											
1.50	221											
1.55	231											
2.00	241											
2.05	251											
2.10	261											
2.15	271											
2.20	281											
2.25	291											
2.30	301											
2.35	311											
2.40	321											
2.45	331											
2.50	341											
2.55	351											
3.00	361											
3.05	371											
3.10	381											
3.15	391											
3.20	401											
3.25	411											
3.30	421											
3.35	431											
3.40	441											
3.45	451											
3.50	461											
3.55	471											
4.00	481											
4.05	491											
4.10	501											
4.15	511											
4.20	521											
4.25	531											
4.30	541											
4.35	551											
4.40	561											

PLATE D-11

4.45 571
4.50 581
4.55 591
5.00 601
5.05 611
5.10 621
5.15 631
5.20 641
5.25 651
5.30 661
5.35 671
5.40 681
5.45 691
5.50 701
5.55 711
6.00 721
6.05 731
6.10 741
6.15 751
6.20 761
6.25 771
6.30 781
6.35 791
6.40 801
6.45 811
6.50 821
6.55 831
7.00 841
7.05 851
7.10 861
7.15 871
7.20 881
7.25 891
7.30 901
7.35 911
7.40 921
7.45 931
7.50 941
7.55 951
8.00 961
8.05 971
8.10 981
8.15 991
8.20 1001
8.25 1011
8.30 1021
8.35 1031
8.40 1041
8.45 1051
8.50 1061
8.55 1071
9.00 1081
9.05 1091
9.10 1101
9.15 1111
9.20 1121
9.25 1131
9.30 1141
9.35 1151
9.40 1161
9.45 1171
9.50 1181

20.15243.1 0
20.20244.1 0
20.25245.1 0
20.30246.1 0
20.35247.1 0
20.40248.1 0
20.45249.1 0
20.50250.1 0
20.55251.1 0
21.00252.1 0
21.05253.1 0
21.10254.1 0
21.15255.1 0
21.20256.1 0
21.25257.1 0
21.30258.1 0
21.35259.1 0
21.40260.1 0
21.45261.1 0
21.50262.1 0
21.55263.1 0
22.00264.1 0
22.05265.1 0
22.10266.1 0
22.15267.1 0
22.20268.1 0
22.25269.1 0
22.30270.1 0
22.35271.1 0
22.40272.1 0
22.45273.1 0
22.50274.1 0
22.55275.1 0
23.00276.1 0
23.05277.1 0
23.10278.1 0
23.15279.1 0
23.20280.1 0
23.25281.1 0
23.30282.1 0
23.35283.1 0
23.40284.1 0
23.45285.1 0
23.50286.1 0
23.55287.1 0
0.00288.1 0

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
				.05	.10	.15	.20	.35	.50	.65	.80	1.00
RATIOS APPLIED TO FLOWS												
HYDROGRAPH AT 000001												
	(	.23	1	128.	255.	383.	510.	893.	1276.	1658.	2041.	2551.
	(	.611	(	3.611	7.221	10.841	14.451	25.281	36.121	46.951	57.791	72.241
ROUTED TO 000002												
	(	.23	1	34.	55.	87.	239.	722.	1092.	1460.	1825.	2315.
	(	.611	(	.961	1.561	2.471	6.771	20.441	30.911	41.331	51.671	65.541

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		ELEVATION		INITIAL VALUE		SPILLWAY CREST		TOP OF DAM	
		STORAGE		945.00		945.00		948.20	
		OUTFLOW		23.		23.		37.	
				0.		0.		50.	
RATIO OF PMF	MAXIMUM RESERVOIR W.S.-ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS		
.05	947.16	0.00	32.	34.	0.00	16.25	0.00		
.10	948.65	.45	39.	55.	2.67	16.42	0.00		
.15	950.19	1.99	48.	81.	4.67	16.33	0.00		
.20	950.92	2.72	52.	239.	6.00	16.00	0.00		
.35	951.98	3.78	59.	722.	7.92	15.83	0.00		
.65	953.00	4.80	66.	1460.	9.92	15.83	0.00		
.80	953.39	5.19	69.	1825.	12.08	15.83	0.00		

1.01	2.35	31	.00	0.00	.00	0.	1.01	14.35	175	.02	.01	.01	21.
1.01	2.40	32	.00	0.00	.00	0.	1.01	14.40	176	.02	.01	.01	21.
1.01	2.45	33	.00	0.00	.00	0.	1.01	14.45	177	.02	.01	.01	21.
1.01	2.50	34	.00	0.00	.00	0.	1.01	14.50	178	.02	.01	.01	21.
1.01	2.55	35	.00	0.00	.00	0.	1.01	14.55	179	.02	.01	.01	21.
1.01	3.00	36	.00	0.00	.00	0.	1.01	15.00	180	.02	.01	.01	21.
1.01	3.05	37	.00	0.00	.00	0.	1.01	15.05	181	.01	.01	.00	20.
1.01	3.10	38	.00	0.00	.00	0.	1.01	15.10	182	.01	.01	.00	17.
1.01	3.15	39	.00	0.00	.00	0.	1.01	15.15	183	.01	.01	.00	15.
1.01	3.20	40	.00	0.00	.00	0.	1.01	15.20	184	.01	.01	.00	13.
1.01	3.25	41	.00	0.00	.00	0.	1.01	15.25	185	.01	.01	.00	12.
1.01	3.30	42	.00	0.00	.00	0.	1.01	15.30	186	.01	.01	.00	12.
1.01	3.35	43	.00	0.00	.00	0.	1.01	15.35	187	.01	.01	.00	11.
1.01	3.40	44	.00	0.00	.00	0.	1.01	15.40	188	.01	.01	.00	11.
1.01	3.45	45	.00	0.00	.00	0.	1.01	15.45	189	.01	.01	.00	11.
1.01	3.50	46	.00	0.00	.00	0.	1.01	15.50	190	.01	.01	.00	11.
1.01	3.55	47	.00	0.00	.00	0.	1.01	15.55	191	.01	.01	.00	11.
1.01	4.00	48	.00	0.00	.00	0.	1.01	16.00	192	.01	.01	.00	11.
1.01	4.05	49	.00	0.00	.00	0.	1.01	16.05	193	.01	.01	.00	11.
1.01	4.10	50	.00	0.00	.00	0.	1.01	16.10	194	.01	.01	.00	11.
1.01	4.15	51	.00	0.00	.00	0.	1.01	16.15	195	.01	.01	.00	11.
1.01	4.20	52	.00	0.00	.00	0.	1.01	16.20	196	.01	.01	.00	11.
1.01	4.25	53	.00	0.00	.00	0.	1.01	16.25	197	.01	.01	.00	11.
1.01	4.30	54	.00	0.00	.00	0.	1.01	16.30	198	.01	.01	.00	11.
1.01	4.35	55	.00	0.00	.00	0.	1.01	16.35	199	.01	.01	.00	11.
1.01	4.40	56	.00	0.00	.00	0.	1.01	16.40	200	.01	.01	.00	11.
1.01	4.45	57	.00	0.00	.00	0.	1.01	16.45	201	.01	.01	.00	11.
1.01	4.50	58	.00	0.00	.00	0.	1.01	16.50	202	.01	.01	.00	11.
1.01	4.55	59	.00	0.00	.00	0.	1.01	16.55	203	.01	.01	.00	11.
1.01	5.00	60	.00	0.00	.00	0.	1.01	17.00	204	.01	.01	.00	11.
1.01	5.05	61	.00	0.00	.00	0.	1.01	17.05	205	.01	.01	.00	11.
1.01	5.10	62	.00	0.00	.00	0.	1.01	17.10	206	.01	.01	.00	11.
1.01	5.15	63	.00	0.00	.00	0.	1.01	17.15	207	.01	.01	.00	11.
1.01	5.20	64	.00	0.00	.00	0.	1.01	17.20	208	.01	.01	.00	11.
1.01	5.25	65	.00	0.00	.00	0.	1.01	17.25	209	.01	.01	.00	11.
1.01	5.30	66	.00	0.00	.00	0.	1.01	17.30	210	.01	.01	.00	11.
1.01	5.35	67	.00	0.00	.00	0.	1.01	17.35	211	.01	.01	.00	11.
1.01	5.40	68	.00	0.00	.00	0.	1.01	17.40	212	.01	.01	.00	11.
1.01	5.45	69	.00	0.00	.00	0.	1.01	17.45	213	.01	.01	.00	11.
1.01	5.50	70	.00	0.00	.00	0.	1.01	17.50	214	.01	.01	.00	11.
1.01	5.55	71	.00	0.00	.00	0.	1.01	17.55	215	.01	.01	.00	11.
1.01	6.00	72	.00	0.00	.00	0.	1.01	18.00	216	.01	.01	.00	11.
1.01	6.05	73	.01	0.00	.01	0.	1.01	18.05	217	.00	.00	.00	11.
1.01	6.10	74	.01	0.00	.01	0.	1.01	18.10	218	.00	.00	.00	9.
1.01	6.15	75	.01	0.00	.01	0.	1.01	18.15	219	.00	.00	.00	7.
1.01	6.20	76	.01	0.00	.01	0.	1.01	18.20	220	.00	.00	.00	6.
1.01	6.25	77	.01	0.00	.01	0.	1.01	18.25	221	.00	.00	.00	6.
1.01	6.30	78	.01	0.00	.01	0.	1.01	18.30	222	.00	.00	.00	5.
1.01	6.35	79	.01	0.00	.01	0.	1.01	18.35	223	.00	.00	.00	5.
1.01	6.40	80	.01	0.00	.01	0.	1.01	18.40	224	.00	.00	.00	5.
1.01	6.45	81	.01	0.00	.01	0.	1.01	18.45	225	.00	.00	.00	5.
1.01	6.50	82	.01	0.00	.01	0.	1.01	18.50	226	.00	.00	.00	5.
1.01	6.55	83	.01	0.00	.01	0.	1.01	18.55	227	.00	.00	.00	5.
1.01	7.00	84	.01	0.00	.01	0.	1.01	19.00	228	.00	.00	.00	5.
1.01	7.05	85	.01	0.00	.01	0.	1.01	19.05	229	.00	.00	.00	5.
1.01	7.10	86	.01	0.00	.01	0.	1.01	19.10	230	.00	.00	.00	5.
1.01	7.15	87	.01	0.00	.01	0.	1.01	19.15	231	.00	.00	.00	5.
1.01	7.20	88	.01	0.00	.01	0.	1.01	19.20	232	.00	.00	.00	5.
1.01	7.25	89	.01	0.00	.01	0.	1.01	19.25	233	.00	.00	.00	5.
1.01	7.30	90	.01	0.00	.01	0.	1.01	19.30	234	.00	.00	.00	5.
1.01	7.35	91	.01	0.00	.01	0.	1.01	19.35	235	.00	.00	.00	5.
1.01	7.40	92	.01	0.00	.01	0.	1.01	19.40	236	.00	.00	.00	5.

1.01	7.45	93	.01	0.00	.01	0.00	.01	0.00	0.	1.01	19.45	237	.00	.00	.00	5.
1.01	7.50	94	.01	0.00	.01	0.00	.01	0.00	0.	1.01	19.50	238	.00	.00	.00	5.
1.01	7.55	95	.01	0.00	.01	0.00	.01	0.00	0.	1.01	19.55	239	.00	.00	.00	5.
1.01	8.00	96	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.00	240	.00	.00	.00	5.
1.01	8.05	97	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.05	241	.00	.00	.00	5.
1.01	8.10	98	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.10	242	.00	.00	.00	5.
1.01	8.15	99	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.15	243	.00	.00	.00	5.
1.01	8.20	100	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.20	244	.00	.00	.00	5.
1.01	8.25	101	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.25	245	.00	.00	.00	5.
1.01	8.30	102	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.30	246	.00	.00	.00	5.
1.01	8.35	103	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.35	247	.00	.00	.00	5.
1.01	8.40	104	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.40	248	.00	.00	.00	5.
1.01	8.45	105	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.45	249	.00	.00	.00	5.
1.01	8.50	106	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.50	250	.00	.00	.00	5.
1.01	8.55	107	.01	0.00	.01	0.00	.01	0.00	0.	1.01	20.55	251	.00	.00	.00	5.
1.01	9.00	108	.01	0.00	.01	0.00	.01	0.00	0.	1.01	21.00	252	.00	.00	.00	5.
1.01	9.05	109	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.05	253	.00	.00	.00	5.
1.01	9.10	110	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.10	254	.00	.00	.00	5.
1.01	9.15	111	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.15	255	.00	.00	.00	5.
1.01	9.20	112	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.20	256	.00	.00	.00	5.
1.01	9.25	113	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.25	257	.00	.00	.00	5.
1.01	9.30	114	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.30	258	.00	.00	.00	5.
1.01	9.35	115	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.35	259	.00	.00	.00	5.
1.01	9.40	116	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.40	260	.00	.00	.00	5.
1.01	9.45	117	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.45	261	.00	.00	.00	5.
1.01	9.50	118	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.50	262	.00	.00	.00	5.
1.01	9.55	119	.02	0.00	.02	0.00	.02	0.00	0.	1.01	21.55	263	.00	.00	.00	5.
1.01	10.00	120	.02	0.00	.02	0.00	.02	0.00	0.	1.01	22.00	264	.00	.00	.00	5.
1.01	10.05	121	.02	0.00	.02	0.00	.02	0.00	0.	1.01	22.05	265	.00	.00	.00	5.
1.01	10.10	122	.02	0.00	.02	0.00	.02	0.00	0.	1.01	22.10	266	.00	.00	.00	5.
1.01	10.15	123	.02	0.00	.02	0.00	.02	0.00	0.	1.01	22.15	267	.00	.00	.00	5.
1.01	10.20	124	.02	0.00	.02	0.00	.02	0.00	0.	1.01	22.20	268	.00	.00	.00	5.
1.01	10.25	125	.02	0.00	.02	0.00	.02	0.00	0.	1.01	22.25	269	.00	.00	.00	5.
1.01	10.30	126	.02	0.00	.02	0.00	.02	0.00	0.	1.01	22.30	270	.00	.00	.00	5.
1.01	10.35	127	.03	0.00	.03	0.00	.03	0.00	0.	1.01	22.35	271	.00	.00	.00	5.
1.01	10.40	128	.03	0.00	.03	0.00	.03	0.00	0.	1.01	22.40	272	.00	.00	.00	5.
1.01	10.45	129	.03	0.00	.03	0.00	.03	0.00	1.	1.01	22.45	273	.00	.00	.00	5.
1.01	10.50	130	.03	0.00	.03	0.00	.03	0.00	1.	1.01	22.50	274	.00	.00	.00	5.
1.01	10.55	131	.03	0.00	.03	0.00	.03	0.00	2.	1.01	22.55	275	.00	.00	.00	5.
1.01	11.00	132	.03	0.00	.03	0.00	.03	0.00	3.	1.01	23.00	276	.00	.00	.00	5.
1.01	11.05	133	.03	0.00	.03	0.00	.03	0.00	3.	1.01	23.05	277	.00	.00	.00	5.
1.01	11.10	134	.03	0.00	.03	0.00	.03	0.00	4.	1.01	23.10	278	.00	.00	.00	5.
1.01	11.15	135	.03	0.00	.03	0.00	.03	0.00	5.	1.01	23.15	279	.00	.00	.00	5.
1.01	11.20	136	.04	0.00	.04	0.00	.04	0.00	6.	1.01	23.20	280	.00	.00	.00	5.
1.01	11.25	137	.04	0.00	.04	0.00	.04	0.00	7.	1.01	23.25	281	.00	.00	.00	5.
1.01	11.30	138	.04	0.01	.04	0.01	.04	0.01	8.	1.01	23.30	282	.00	.00	.00	5.
1.01	11.35	139	.10	.02	.10	.02	.10	.02	10.	1.01	23.35	283	.00	.00	.00	5.
1.01	11.40	140	.10	.02	.10	.02	.10	.02	17.	1.01	23.40	284	.00	.00	.00	5.
1.01	11.45	141	.10	.02	.10	.02	.10	.02	25.	1.01	23.45	285	.00	.00	.00	5.
1.01	11.50	142	.19	.03	.19	.03	.19	.03	37.	1.01	23.50	286	.00	.00	.00	5.
1.01	11.55	143	.19	.06	.19	.06	.19	.06	56.	1.01	23.55	287	.00	.00	.00	5.
1.01	12.00	144	.39	.15	.39	.15	.39	.15	92.	1.02	0.00	288	.00	.00	.00	5.

PLATE D-21

SUM 5.00 1.95 3.04 3505.
(127.11 50.11 77.11 99.251)

CFS	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CHS	299.	42.	12.	12.	3525.
INCHES	B.	1.67	1.95	1.95	100.
PM	42.51	49.44	49.44	49.44	1.95
AC-FI	21.	24.	24.	24.	24.

HYDROGRAPH AT STAD00001 FOR PLAN 1, RTIU 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	299.	42.	12.	0.	3525.
CMS	0.	1.	0.	0.	100.
INCHES		1.67	1.95	1.95	1.95
MM		42.51	49.44	49.44	49.44
AC-FT		21.	24.	24.	24.
THOUS. CU-M		26.	30.	30.	30.

HYDROGRAPH ROUTING

ROUTED FLOWS THRU RES NO 11010

ISLAC	ICOMP	IECON	ITAPE	JPLI	JPRI	JNAME	ISTAGE	IAUTO
CCCC02	1	0	0	2	0	1	0	0
ROUTING DATA								
QLOSS	CLCSS	AVG	IRCS	ISAME	IOPI	IPMP	LSIR	
0.0	0.000	0.00	1	1	0	0	0	

MSIPS	MSIDL	LAG	AMSK	X	ISK	STORA	ISPRAT	
1	0	0	0.000	0.000	0.000	-945.	-1	

STAGE	945.00	945.40	945.70	946.10	946.40	946.80	947.10	948.10	949.10	950.10
	951.10	953.10	956.10							
FLOW	0.00	1.00	4.00	9.00	20.00	25.00	33.00	49.00	60.00	69.00
	77.00	90.00	111.00							
CAPACITY	0.	1.	2.	4.	7.	13.	19.	31.	46.	79.
ELEVATION	935.	936.	937.	938.	940.	942.	944.	947.	950.	955.

CREL	SPWID	CUOM	EXPM	ELEVL	CUQL	CAREA	EXPL
945.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TUPEL	CUQU	EXPD	DAPWID
948.2	2.9	1.5	201.

CREST LENGTH	11.	53.	65.	96.	115.	128.	163.	201.
AT OR BELOW								
ELEVATION	947.8	950.3	950.5	951.4	952.3	952.8	954.1	956.0

STATION 000002, PLAN 1, RTIU 1

MC-DA	HD-MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	0.5	1	.08	0.	0.	23.	945.0
1.01	.10	2	.17	0.	0.	23.	945.0
1.01	.15	3	.25	0.	0.	23.	945.0

1.01	.20	4	.33	0.	0.	0.	23.	945.0
1.01	.25	5	.42	0.	0.	0.	23.	945.0
1.01	.30	6	.50	0.	0.	0.	23.	945.0
1.01	.35	7	.58	0.	0.	0.	23.	945.0
1.01	.40	8	.67	0.	0.	0.	23.	945.0
1.01	.45	9	.75	0.	0.	0.	23.	945.0
1.01	.50	10	.83	0.	0.	0.	23.	945.0
1.01	.55	11	.92	0.	0.	0.	23.	945.0
1.01	1.00	12	1.00	0.	0.	0.	23.	945.0
1.01	1.05	13	1.08	0.	0.	0.	23.	945.0
1.01	1.10	14	1.17	0.	0.	0.	23.	945.0
1.01	1.15	15	1.25	0.	0.	0.	23.	945.0
1.01	1.20	16	1.33	0.	0.	0.	23.	945.0
1.01	1.25	17	1.42	0.	0.	0.	23.	945.0
1.01	1.30	18	1.50	0.	0.	0.	23.	945.0
1.01	1.35	19	1.58	0.	0.	0.	23.	945.0
1.01	1.40	20	1.67	0.	0.	0.	23.	945.0
1.01	1.45	21	1.75	0.	0.	0.	23.	945.0
1.01	1.50	22	1.83	0.	0.	0.	23.	945.0
1.01	1.55	23	1.92	0.	0.	0.	23.	945.0
1.01	2.00	24	2.00	0.	0.	0.	23.	945.0
1.01	2.05	25	2.08	0.	0.	0.	23.	945.0
1.01	2.10	26	2.17	0.	0.	0.	23.	945.0
1.01	2.15	27	2.25	0.	0.	0.	23.	945.0
1.01	2.20	28	2.33	0.	0.	0.	23.	945.0
1.01	2.25	29	2.42	0.	0.	0.	23.	945.0
1.01	2.30	30	2.50	0.	0.	0.	23.	945.0
1.01	2.35	31	2.58	0.	0.	0.	23.	945.0
1.01	2.40	32	2.67	0.	0.	0.	23.	945.0
1.01	2.45	33	2.75	0.	0.	0.	23.	945.0
1.01	2.50	34	2.83	0.	0.	0.	23.	945.0
1.01	2.55	35	2.92	0.	0.	0.	23.	945.0
1.01	3.00	36	3.00	0.	0.	0.	23.	945.0
1.01	3.05	37	3.08	0.	0.	0.	23.	945.0
1.01	3.10	38	3.17	0.	0.	0.	23.	945.0
1.01	3.15	39	3.25	0.	0.	0.	23.	945.0
1.01	3.20	40	3.33	0.	0.	0.	23.	945.0
1.01	3.25	41	3.42	0.	0.	0.	23.	945.0
1.01	3.30	42	3.50	0.	0.	0.	23.	945.0
1.01	3.35	43	3.58	0.	0.	0.	23.	945.0
1.01	3.40	44	3.67	0.	0.	0.	23.	945.0
1.01	3.45	45	3.75	0.	0.	0.	23.	945.0
1.01	3.50	46	3.83	0.	0.	0.	23.	945.0
1.01	3.55	47	3.92	0.	0.	0.	23.	945.0
1.01	4.00	48	4.00	0.	0.	0.	23.	945.0
1.01	4.05	49	4.08	0.	0.	0.	23.	945.0
1.01	4.10	50	4.17	0.	0.	0.	23.	945.0
1.01	4.15	51	4.25	0.	0.	0.	23.	945.0
1.01	4.20	52	4.33	0.	0.	0.	23.	945.0
1.01	4.25	53	4.42	0.	0.	0.	23.	945.0
1.01	4.30	54	4.50	0.	0.	0.	23.	945.0
1.01	4.35	55	4.58	0.	0.	0.	23.	945.0
1.01	4.40	56	4.67	0.	0.	0.	23.	945.0
1.01	4.45	57	4.75	0.	0.	0.	23.	945.0
1.01	4.50	58	4.83	0.	0.	0.	23.	945.0
1.01	4.55	59	4.92	0.	0.	0.	23.	945.0
1.01	5.00	60	5.00	0.	0.	0.	23.	945.0
1.01	5.05	61	5.08	0.	0.	0.	23.	945.0
1.01	5.10	62	5.17	0.	0.	0.	23.	945.0
1.01	5.15	63	5.25	0.	0.	0.	23.	945.0
1.01	5.20	64	5.33	0.	0.	0.	23.	945.0
1.01	5.25	65	5.42	0.	0.	0.	23.	945.0

PLATE D-23

1.01	5.30	66	5.50	0.	0.	0.	23.	945.0
1.01	5.35	67	5.58	0.	0.	0.	23.	945.0
1.01	5.40	68	5.67	0.	0.	0.	23.	945.0
1.01	5.45	69	5.75	0.	0.	0.	23.	945.0
1.01	5.50	70	5.83	0.	0.	0.	23.	945.0
1.01	5.55	71	5.92	0.	0.	0.	23.	945.0
1.01	6.00	72	6.00	0.	0.	0.	23.	945.0
1.01	6.05	73	6.08	0.	0.	0.	23.	945.0
1.01	6.10	74	6.17	0.	0.	0.	23.	945.0
1.01	6.15	75	6.25	0.	0.	0.	23.	945.0
1.01	6.20	76	6.33	0.	0.	0.	23.	945.0
1.01	6.25	77	6.42	0.	0.	0.	23.	945.0
1.01	6.30	78	6.50	0.	0.	0.	23.	945.0
1.01	6.35	79	6.58	0.	0.	0.	23.	945.0
1.01	6.40	80	6.67	0.	0.	0.	23.	945.0
1.01	6.45	81	6.75	0.	0.	0.	23.	945.0
1.01	6.50	82	6.83	0.	0.	0.	23.	945.0
1.01	6.55	83	6.92	0.	0.	0.	23.	945.0
1.01	7.00	84	7.00	0.	0.	0.	23.	945.0
1.01	7.05	85	7.08	0.	0.	0.	23.	945.0
1.01	7.10	86	7.17	0.	0.	0.	23.	945.0
1.01	7.15	87	7.25	0.	0.	0.	23.	945.0
1.01	7.20	88	7.33	0.	0.	0.	23.	945.0
1.01	7.25	89	7.42	0.	0.	0.	23.	945.0
1.01	7.30	90	7.50	0.	0.	0.	23.	945.0
1.01	7.35	91	7.58	0.	0.	0.	23.	945.0
1.01	7.40	92	7.67	0.	0.	0.	23.	945.0
1.01	7.45	93	7.75	0.	0.	0.	23.	945.0
1.01	7.50	94	7.83	0.	0.	0.	23.	945.0
1.01	7.55	95	7.92	0.	0.	0.	23.	945.0
1.01	8.00	96	8.00	0.	0.	0.	23.	945.0
1.01	8.05	97	8.08	0.	0.	0.	23.	945.0
1.01	8.10	98	8.17	0.	0.	0.	23.	945.0
1.01	8.15	99	8.25	0.	0.	0.	23.	945.0
1.01	8.20	100	8.33	0.	0.	0.	23.	945.0
1.01	8.25	101	8.42	0.	0.	0.	23.	945.0
1.01	8.30	102	8.50	0.	0.	0.	23.	945.0
1.01	8.35	103	8.58	0.	0.	0.	23.	945.0
1.01	8.40	104	8.67	0.	0.	0.	23.	945.0
1.01	8.45	105	8.75	0.	0.	0.	23.	945.0
1.01	8.50	106	8.83	0.	0.	0.	23.	945.0
1.01	8.55	107	8.92	0.	0.	0.	23.	945.0
1.01	9.00	108	9.00	0.	0.	0.	23.	945.0
1.01	9.05	109	9.08	0.	0.	0.	23.	945.0
1.01	9.10	110	9.17	0.	0.	0.	23.	945.0
1.01	9.15	111	9.25	0.	0.	0.	23.	945.0
1.01	9.20	112	9.33	0.	0.	0.	23.	945.0
1.01	9.25	113	9.42	0.	0.	0.	23.	945.0
1.01	9.30	114	9.50	0.	0.	0.	23.	945.0
1.01	9.35	115	9.58	0.	0.	0.	23.	945.0
1.01	9.40	116	9.67	0.	0.	0.	23.	945.0
1.01	9.45	117	9.75	0.	0.	0.	23.	945.0
1.01	9.50	118	9.83	0.	0.	0.	23.	945.0
1.01	9.55	119	9.92	0.	0.	0.	23.	945.0
1.01	10.00	120	10.00	0.	0.	0.	23.	945.0
1.01	10.05	121	10.08	0.	0.	0.	23.	945.0
1.01	10.10	122	10.17	0.	0.	0.	23.	945.0
1.01	10.15	123	10.25	0.	0.	0.	23.	945.0
1.01	10.20	124	10.33	0.	0.	0.	23.	945.0
1.01	10.25	125	10.42	0.	0.	0.	23.	945.0
1.01	10.30	126	10.50	0.	0.	0.	23.	945.0
1.01	10.35	127	10.58	0.	0.	0.	23.	945.0

1.01	10.40	128	10.67	0.	0.	23.	945.0
1.01	10.45	129	10.75	1.	0.	23.	945.0
1.01	10.50	130	10.83	1.	0.	23.	945.0
1.01	10.55	131	10.92	2.	0.	23.	945.0
1.01	11.00	132	11.00	3.	0.	23.	945.0
1.01	11.05	133	11.08	3.	0.	23.	945.0
1.01	11.10	134	11.17	4.	0.	23.	945.0
1.01	11.15	135	11.25	5.	0.	23.	945.0
1.01	11.20	136	11.33	6.	0.	23.	945.0
1.01	11.25	137	11.42	7.	0.	23.	945.0
1.01	11.30	138	11.50	8.	0.	23.	945.0
1.01	11.35	139	11.58	10.	0.	23.	945.1
1.01	11.40	140	11.67	17.	0.	23.	945.1
1.01	11.45	141	11.75	25.	0.	24.	945.1
1.01	11.50	142	11.83	37.	0.	24.	945.2
1.01	11.55	143	11.92	56.	1.	24.	945.3
1.01	12.00	144	12.00	92.	1.	24.	945.4
1.01	12.05	145	12.08	174.	3.	25.	945.6
1.01	12.10	146	12.17	272.	8.	27.	946.0
1.01	12.15	147	12.25	299.	21.	28.	946.2
1.01	12.20	148	12.33	260.	28.	31.	946.9
1.01	12.25	149	12.42	202.	34.	32.	947.2
1.01	12.30	150	12.50	159.	38.	33.	947.4
1.01	12.35	151	12.58	128.	40.	34.	947.5
1.01	12.40	152	12.67	97.	41.	34.	947.6
1.01	12.45	153	12.75	72.	42.	34.	947.7
1.01	12.50	154	12.83	56.	43.	35.	947.7
1.01	12.55	155	12.92	48.	43.	35.	947.7
1.01	13.00	156	13.00	44.	43.	35.	947.7
1.01	13.05	157	13.08	41.	43.	35.	947.7
1.01	13.10	158	13.17	38.	43.	35.	947.7
1.01	13.15	159	13.25	36.	43.	35.	947.7
1.01	13.20	160	13.33	35.	43.	35.	947.7
1.01	13.25	161	13.42	35.	42.	35.	947.7
1.01	13.30	162	13.50	34.	42.	34.	947.7
1.01	13.35	163	13.58	33.	42.	34.	947.7
1.01	13.40	164	13.67	29.	42.	34.	947.7
1.01	13.45	165	13.75	25.	42.	34.	947.6
1.01	13.50	166	13.83	23.	41.	34.	947.6
1.01	13.55	167	13.92	22.	41.	34.	947.6
1.01	14.00	168	14.00	21.	40.	34.	947.5
1.01	14.05	169	14.08	21.	40.	34.	947.5
1.01	14.10	170	14.17	21.	40.	34.	947.5
1.01	14.15	171	14.25	21.	39.	33.	947.5
1.01	14.20	172	14.33	21.	38.	33.	947.5
1.01	14.25	173	14.42	21.	38.	33.	947.4
1.01	14.30	174	14.50	21.	38.	33.	947.4
1.01	14.35	175	14.58	21.	38.	33.	947.4
1.01	14.40	176	14.67	21.	37.	33.	947.4
1.01	14.45	177	14.75	21.	37.	33.	947.3
1.01	14.50	178	14.83	21.	37.	33.	947.3
1.01	14.55	179	14.92	21.	36.	33.	947.3
1.01	15.00	180	15.00	21.	36.	32.	947.3
1.01	15.05	181	15.08	20.	36.	32.	947.3
1.01	15.10	182	15.17	17.	35.	32.	947.2
1.01	15.15	183	15.25	15.	35.	32.	947.2
1.01	15.20	184	15.33	13.	34.	32.	947.2
1.01	15.25	185	15.42	12.	34.	32.	947.2
1.01	15.30	186	15.50	12.	33.	32.	947.1
1.01	15.35	187	15.58	11.	33.	32.	947.1
1.01	15.40	188	15.67	11.	32.	31.	947.1
1.01	15.45	189	15.75	11.	31.	31.	947.0

1.01	15.50	190	15.83	11.	31.	31.	947.0
1.01	15.55	191	15.92	11.	30.	31.	947.0
1.01	16.00	192	16.00	11.	29.	31.	947.0
1.01	16.05	193	16.08	11.	28.	31.	946.9
1.01	16.10	194	16.17	11.	28.	31.	946.9
1.01	16.15	195	16.25	11.	27.	30.	946.9
1.01	16.20	196	16.33	11.	26.	30.	946.8
1.01	16.25	197	16.42	11.	26.	30.	946.8
1.01	16.30	198	16.50	11.	25.	30.	946.8
1.01	16.35	199	16.58	11.	25.	30.	946.8
1.01	16.40	200	16.67	11.	24.	30.	946.8
1.01	16.45	201	16.75	11.	24.	30.	946.7
1.01	16.50	202	16.83	11.	24.	30.	946.7
1.01	16.55	203	16.92	11.	24.	30.	946.7
1.01	17.00	204	17.00	11.	23.	30.	946.7
1.01	17.05	205	17.08	11.	23.	30.	946.7
1.01	17.10	206	17.17	11.	23.	30.	946.6
1.01	17.15	207	17.25	11.	23.	29.	946.6
1.01	17.20	208	17.33	11.	22.	29.	946.6
1.01	17.25	209	17.42	11.	22.	29.	946.6
1.01	17.30	210	17.50	11.	22.	29.	946.6
1.01	17.35	211	17.58	11.	22.	29.	946.5
1.01	17.40	212	17.67	11.	22.	29.	946.5
1.01	17.45	213	17.75	11.	21.	29.	946.5
1.01	17.50	214	17.83	11.	21.	29.	946.5
1.01	17.55	215	17.92	11.	21.	29.	946.5
1.01	18.00	216	18.00	11.	21.	29.	946.5
1.01	18.05	217	18.08	11.	21.	29.	946.4
1.01	18.10	218	18.17	9.	20.	29.	946.4
1.01	18.15	219	18.25	7.	20.	29.	946.4
1.01	18.20	220	18.33	6.	19.	29.	946.4
1.01	18.25	221	18.42	6.	19.	28.	946.4
1.01	18.30	222	18.50	5.	18.	28.	946.3
1.01	18.35	223	18.58	5.	17.	28.	946.3
1.01	18.40	224	18.67	5.	16.	28.	946.3
1.01	18.45	225	18.75	5.	16.	28.	946.3
1.01	18.50	226	18.83	5.	15.	28.	946.3
1.01	18.55	227	18.92	5.	14.	28.	946.2
1.01	19.00	228	19.00	5.	14.	28.	946.2
1.01	19.05	229	19.08	5.	13.	28.	946.2
1.01	19.10	230	19.17	5.	13.	28.	946.2
1.01	19.15	231	19.25	5.	12.	28.	946.2
1.01	19.20	232	19.33	5.	12.	28.	946.2
1.01	19.25	233	19.42	5.	11.	20.	946.2
1.01	19.30	234	19.50	5.	11.	28.	946.2
1.01	19.35	235	19.58	5.	11.	28.	946.1
1.01	19.40	236	19.67	5.	10.	28.	946.1
1.01	19.45	237	19.75	5.	10.	28.	946.1
1.01	19.50	238	19.83	5.	10.	27.	946.1
1.01	19.55	239	19.92	5.	9.	27.	946.1
1.01	20.00	240	20.00	5.	9.	27.	946.1
1.01	20.05	241	20.08	5.	9.	27.	946.1
1.01	20.10	242	20.17	5.	9.	27.	946.1
1.01	20.15	243	20.25	5.	9.	27.	946.1
1.01	20.20	244	20.33	5.	9.	27.	946.1
1.01	20.25	245	20.42	5.	9.	27.	946.1
1.01	20.30	246	20.50	5.	9.	27.	946.1
1.01	20.35	247	20.58	5.	9.	27.	946.1
1.01	20.40	248	20.67	5.	8.	27.	946.1
1.01	20.45	249	20.75	5.	8.	27.	946.1
1.01	20.50	250	20.83	5.	8.	27.	946.0
1.01	20.55	251	20.92	5.	8.	27.	946.0

1.01	21.00	252	21.08	5.	8.	27.	946.0
1.01	21.05	253	21.08	5.	8.	27.	946.0
1.01	21.10	254	21.17	5.	8.	27.	946.0
1.01	21.15	255	21.25	5.	8.	27.	946.0
1.01	21.20	256	21.33	5.	8.	27.	946.0
1.01	21.25	257	21.42	5.	8.	27.	946.0
1.01	21.30	258	21.50	5.	8.	27.	946.0
1.01	21.35	259	21.58	5.	8.	27.	946.0
1.01	21.40	260	21.67	5.	8.	27.	946.0
1.01	21.45	261	21.75	5.	8.	27.	946.0
1.01	21.50	262	21.83	5.	8.	27.	946.0
1.01	21.55	263	21.92	5.	8.	27.	946.0
1.01	22.00	264	22.00	5.	8.	27.	946.0
1.01	22.05	265	22.08	5.	7.	27.	946.0
1.01	22.10	266	22.17	5.	7.	27.	946.0
1.01	22.15	267	22.25	5.	7.	27.	946.0
1.01	22.20	268	22.33	5.	7.	27.	946.0
1.01	22.25	269	22.42	5.	7.	27.	946.0
1.01	22.30	270	22.50	5.	7.	27.	946.0
1.01	22.35	271	22.58	5.	7.	27.	946.0
1.01	22.40	272	22.67	5.	7.	27.	946.0
1.01	22.45	273	22.75	5.	7.	27.	945.9
1.01	22.50	274	22.83	5.	7.	27.	945.9
1.01	22.55	275	22.92	5.	7.	27.	945.9
1.01	23.00	276	23.00	5.	7.	27.	945.9
1.01	23.05	277	23.08	5.	7.	27.	945.9
1.01	23.10	278	23.17	5.	7.	27.	945.9
1.01	23.15	279	23.25	5.	7.	27.	945.9
1.01	23.20	280	23.33	5.	7.	27.	945.9
1.01	23.25	281	23.42	5.	7.	27.	945.9
1.01	23.30	282	23.50	5.	7.	27.	945.9
1.01	23.35	283	23.58	5.	7.	27.	945.9
1.01	23.40	284	23.67	5.	7.	27.	945.9
1.01	23.45	285	23.75	5.	7.	27.	945.9
1.01	23.50	286	23.83	5.	7.	27.	945.9
1.01	23.55	287	23.92	5.	7.	27.	945.9
1.02	0.00	288	24.00	5.	7.	27.	945.9

PEAK OUTFLOW IS 43. AT TIME 13.00 HOURS

CFS	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
43.	43.	32.	10.	10.	3008.
INCHES	1.	1.	0.	0.	85.
MM	1.29	1.66	1.66	1.66	1.66
AC-ET	32.71	42.19	42.19	42.19	42.19
THOUS CU M	16.	21.	21.	21.	21.
	20.	26.	26.	26.	26.

UVF

STATION000002

INFLOW, OUTFLOW, AND OBSERVED ELOW

0.	40.	80.	120.	160.	200.	240.	280.	320.	0.	0.	0.	0.
.05												
.10												
.15												
.20												
.25												
.30												
.35												
.40												
.45												
.50												
.55												
1.00												
1.05												
1.10												
1.15												
1.20												
1.25												
1.30												
1.35												
1.40												
1.45												
1.50												
1.55												
2.00												
2.05												
2.10												
2.15												
2.20												
2.25												
2.30												
2.35												
2.40												
2.45												
2.50												
2.55												
3.00												
3.05												
3.10												
3.15												
3.20												
3.25												
3.30												
3.35												
3.40												
3.45												
3.50												
3.55												
4.00												
4.05												
4.10												
4.15												
4.20												
4.25												
4.30												
4.35												
4.40												
4.45												

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION STATION AREA PLAN RATIO 1
 1.00

HYDROGRAPH AT 000001 1 290.
 (.61) (8.461)

ROUTED TO 000002 1 43.
 (.61) (1.221)

PLAN I

.....	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	STORAGE	945.00	945.00	948.20
	OUTFLOW	23.	23.	37.
		0.	0.	50.

RATIO	MAXIMUM	MAXIMUM	MAXIMUM	CURATION	TIME OF	TIME OF
OF	RESERVOIR	DEPTH	STORAGE	OVER TOP	MAX OUTFLOW	FAILURE
PMF	W.S.ELEV	OVER DAM	AC-FT	CFB	HOURS	HOURS
1.00	947.72	0.00	35.	43.	6.00	13.00
						0.00